

Serial No. 09/839,941

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RD-27,966

**Remarks**

Applicants thank the Examiner for the courtesies extended to Applicants' undersigned representative, Stanislav Antolin, during the telephonic interview on March 27, 2003.

The January 28, 2003 Final Office Action has been carefully considered. After such consideration, Claims 1 and 59 have been amended along the line suggested by the Examiner. As such, Claims 1-46 and 59-106 remain.

The Office Action rejected under 35 U.S.C. § 103(a) Claims 1-5, 14, 18, 19, 33, 36, 59-62, 71, 75 and 76 as being unpatentable over U.S. Patent No. 6,104,074(Chen) in view of U.S. Patent No. 5,679,152(Tischler et al.) and U.S. Patent No. 6,377,596(Tanaka et al.). Claims 6-13, 15-17, 20-22, 63-70, 72-74, 77-79 and 107 as being unpatentable over U.S. Patent No. 6,104,074(Chen) in view of U.S. Patent No. 6,034,404(Soares). Claims 23-32, 34, 35, 37-44, 80-92 and 94-101 as being unpatentable over U.S. Patent No. 6,104,074(Chen) in view of U.S. Patent No. 4,902,136(Mueller) and U.S. Patent No. 5,698,865(Gerner et al.). Claims 45-49 and 102-106 as being unpatentable over U.S. Patent No. 6,104,074(Chen) in view of U.S. Patent No. 6,121,634(Saito et al). Applicants traverse the 35 U.S.C. § 103(a) rejections of Claims 59-106. In regard to the rejection Claims 1 and 59 under 35 U.S.C. § 103(a), Applicants submit that the amendment of Claims 1 and 59 renders the rejection moot. The rejection of Claim 1 being moot renders the rejection of Claims 2-49 moot. The rejection of Claim 59 being moot renders the rejection of Claims 60-106 moot. Thus, the 35 U.S.C. § 103(a) rejections of Claims 1-49 and Claims 59-106 being moot should be withdrawn.

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In light of the amendment and remarks presented herein, Applicants submit that Claims 1-46 and 59-106 of the case are in condition for immediate allowance and respectfully requests such action. If, however, any issues remain unresolved, the Examiner is invited to telephone the Applicants' counsel at the number provided below.

Respectfully submitted,

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ATTACHMENT A

Marked-up versions of amended Claims 1 and 69 are provided below.

Marked-up version of Claim 1:

[c02] 1.(Twice Amended)A photodetector (100, 200, 300), said photodetector (100, 200, 300), comprising:

d) a substrate (102, 202, 306), said substrate comprising gallium nitride grown by precipitating gallium nitride onto a crystal gallium nitride seed [having a dislocation density of less than about  $10^3 \text{ cm}^{-2}$ ];

e) at least one active layer (104, 302) disposed on said substrate (102, 202, 306); and

f) at least one conductive contact structure (106, 210, 308) affixed to at least one of said substrate (102, 202, 306) and said at least one active layer (104).

Marked-up version of Claim 5:

[c60] 59.(Amended)A photodetector, said photodetector comprising:

a) a gallium nitride substrate, said gallium nitride substrate comprising a single crystal gallium nitride wafer grown by precipitating gallium nitride onto a crystal gallium nitride seed and having a dislocation density of less than about  $10^5 \text{ cm}^{-2}$ ;

b) at least one active layer disposed on said gallium nitride substrate, said at least one active layer comprising  $\text{Ga}_{1-x-y}\text{Al}_x\text{In}_y\text{N}_{1-x-w}\text{P}_z\text{As}_w$ , wherein  $0 \leq x, y, z, w \leq 1$ ,  $0 \leq x + y \leq 1$ , and  $0 \leq z + w \leq 1$ ; and

c) at least one conductive contact structure affixed to at least one of said gallium nitride substrate and said at least one active layer.

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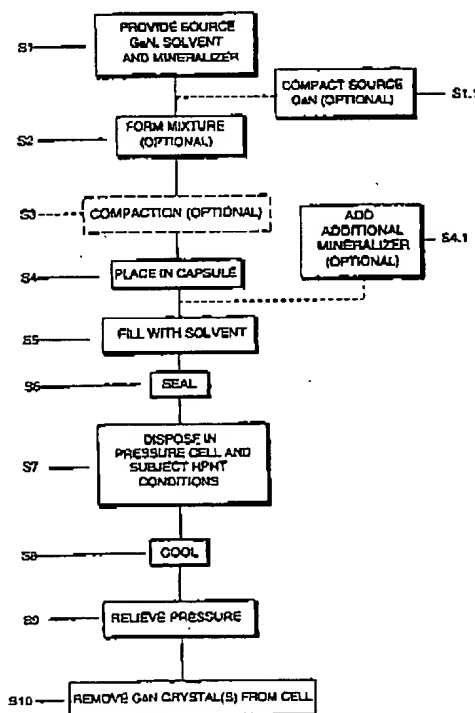
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(54) Title: CRYSTALLINE GALLIUM NITRIDE AND METHOD FOR FORMING CRYSTALLINE GALLIUM NITRIDE



(57) Abstract: A gallium nitride growth process forms crystalline gallium nitride. The process comprises the steps of providing a source gallium nitride (15); providing mineralizer (17); providing solvent (17); providing a capsule (10); disposing the source gallium nitride, mineralizer and solvent in the capsule; sealing the capsule; disposing the capsule in a pressure cell (1); and subjecting the pressure cell to high pressure and high temperature (HPHT) conditions for a length of time sufficient to dissolve the source gallium nitride and re-precipitate the source gallium nitride into at least one gallium nitride crystal. The invention also provides for gallium nitride crystals formed by the processes of the invention.

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